CLAIMS

I claim:

1. A mass flow measuring device comprising:

an evaporator having a housing defining a flow path and an outlet for discharging a gas and liquid evaporant mix along the flow path;

an inlet plenum communicating with the evaporator for receiving inlet gases, liquids or a mixture of gases and liquids flowing along respective inlet flow paths,

an electric heater means for heating the inlet gases, liquids and gas liquid mixtures within the evaporator flow path;

electric sensor means connected to the electric heater means for measuring heater energy consumption;

flow sensor means for measuring respective flow rates of inlet gases, liquids and mixtures;

temperature sensor means provided in the respective inlet flow paths for directly measuring temperatures of the inlet gases, liquids and mixtures, and temperature sensor means provided in the outlet flow path for directly measuring the temperature of the discharged gas and liquid evaporant mix;

a mass flow rate measurement means responsive to the electric sensor means, flow sensor means and temperature sensor means for employing an energy balance established between the heater energy consumption and energy absorbed by the gas, liquid and mixture of gas and liquid, such that mass flow is measured based on precise determination of energy absorbed, inlet flow rates, and inlet and outlet temperatures.

2. A mass flow-measuring device according to claim 1 further comprising:

electric heater means provided in the flow path of the evaporator, coaxially with respect to the evaporator housing, for heating gases, liquids and gas liquid mixtures in the flow path.

3. A mass flow-measuring device according to claim 1 further comprising:

one or more diversion fins provided in the evaporator housing for inducing a spiral or helical flow of liquids or a mixture of gases and liquids flowing in the flow path through the evaporator.

4. A mass flow measuring device according to claim 1 further comprising:

temperature sensor means provided in the middle of respective inlet flow paths for directly measuring temperatures of the inlet gases, liquids and mixtures, and temperature sensor means provided in centrally in the outlet flow path for directly measuring the temperature of the discharged gas and liquid evaporant mix.

5. A mass flow measuring device comprising:

an evaporator defining a flow path,

an inlet plenum communicating with the evaporator for receiving inlet gases, liquids, or a mixture of gases and liquids flowing along respective inlet flow paths, and;

electric heater means provided coaxially in the evaporator flow path for heating gases, liquids and gas liquid mixtures passing through the evaporator;

an outlet for discharging a heated gas and liquid evaporant mix;

an electric sensor means connected to the electric heater means for measuring heater energy consumption with respect to a predetermined amount of gas and liquid evaporant mix ;

a flow sensor means for measuring respective flow rates of inlet gases, liquids and mixtures corresponding to the predetermined amount of gas and liquid evaporant ;

temperature sensor means provided centrally in the respective inlet flow paths for directly measuring temperatures of the corresponding amount of inlet gases, liquids and mixtures, and

temperature sensor means provided centrally in the outlet for directly measuring the temperature of the discharged gas and liquid evaporant mix;

a mass flow rate measurement means responsive to the electric sensor means, flow sensor means and temperature sensor means for determining mass flow based on precise measurement of inlet flow rates, inlet and outlet temperatures and energy absorbed during heating,.